

KNOWLEDGE BASED ECONOMY –TECHNOLOGICAL PERSPECTIVE: IMPLICATIONS AND SOLUTIONS FOR AGILITY IMPROVEMENT AND INNOVATION ACHIEVEMENT IN HIGHER EDUCATION

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Abstract

Nowadays, the universities, as driving forces of innovative economy and as components of modern society, based on knowledge and collaboration, face a number of challenges and difficulties. In order to overcome them and to create/ensure the bases of eScience education and research activities, universities have to change culturally, strategically, and operationally. The paper highlights the need for ICT (Information and Communications Technology) use and its implications for higher education. In addition, the study places the theoretical aspects into a specific context, combining technologies through interfunctionality in order to ensure academic education agility and innovation. This involves the use of knowledge, process management, service oriented architectures, and Cloud solutions, exemplifying on the Academy of Economic Studies, Bucharest case. The integrated approach is extended using the SharePoint 2010 platform to improve academic management and achieve harmonization of teaching and research and development content and methods with European Union standards. The platform has been implemented and tested within two AES departments and the Master's Degree Studies in Computer Economics. The results have encouraged the integration of the proposed solution within the institution. The study was based on the authors' competences in the areas addressed and was joined with a rigorous analysis of technology trends and various EU countries (Italy, Germany, France, Belgium, Netherlands etc.) universities outputs regarding knowledge economy implications for economic higher education studies.

Keywords: knowledge-based economy, information and communications technology, university studies in economics, university management, agility, innovation, SharePoint 2010

JEL Classification: A23, I23, O32, O33

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Introduction

This study initiator was the bidirectional relationship between higher education (particularly economic and business studies) and the knowledge-based economy. Therein, higher education has been recognized over time as one of the social development foundations. Through partnerships among universities, government and industries, researchers and students involved in the change of society and the entire world economy (Lazowska, Lee Elliott and Smarr, 2008). Moreover, the last years' higher education trend, namely universities' transition to research universities, represents the main driving force of innovative economy.

In order to achieve this goal, universities try to upgrade IT (Information Technology) infrastructure, as support for eScience research and education activities. Therefore, higher education institutions must know and understand students' needs in terms of IT and access to institutional networks, regardless of time and place. Universities recognize the need to adopt new technologies, new methods, tools, and techniques to meet the needs of the twenty-first century students (see Niță and Agheorghiesei, 2010; Plumb and Zamfir, 2009). At the same time, researchers need access to the latest computing resources to be able to run experiments and analyze results (see Zaman, Sandu and Anghel, 2009).

Therefore, nowadays we face a significant increase of higher education costs and a cut in universities allotted budgets, which leads to an increased pressure in finding alternatives that would support the achievement of universities' goals as such - educating students and performing research. In the modern knowledge-based economy, universities should follow any businesses conducts and behaviors, aiming at becoming intelligent universities. They must use the tools provided by the knowledge-based economy to capitalize on market opportunities and turn them into customer value.

In response to market pressures, universities must perform cultural, strategic, and operational changes as a prerequisite for achieving agility, innovation, and alignment with European Union (EU) standards. Hereof, this study identifies the main technological implications of the knowledge economy on higher education, both at managerial level and in the education and research & development processes. In addition, the study places the theoretical aspects into a specific context, presenting an integrated technological solution in higher education, applied in the Academy of Economic Studies, Bucharest. The solution merges the use of process management (Mircea, in press), knowledge and Business Intelligence (Mircea, Ghilic-Micu and Stoica, 2010), service-oriented architecture and the Cloud solutions (Mircea, 2010; Mircea and Andreescu, 2010) in order to improve agility and achieve innovation, while supporting university in cutting expenses. The last part extends the solution with the SharePoint 2010 platform to improve university management and harmonize the content, teaching, and research & development methods with the EU standards. The SharePoint 2010 platform has been implemented and tested within two departments (Networks and Public Acquisitions) and first year Master's Degree Computer Economics Course (131 students).

The research methodology consisted in rigorous analysis of IT trends, of EU universities gained knowledge and experience merged with the authors' practical experience in IT, education, management, and procurement. The research used theoretical documentation, direct observation and practical documentation in the specified areas, survey, data analysis and synthesis of information.

The survey used a 20-question questionnaire, distributed during "Virtual organization of activities" subject tutorial. The students' ranges of age and work experience in the sample were age between 21-23, ca 44%, 0 years experience, 11% less than 1 year experience, 41% between 1-3 years, 1 student aged 45 counted 25 years experience and 1 student aged 32 counted 10 years experience. The survey aimed at assessing AES students' perception regarding use of ICT (Information and Communications Technology) and SharePoint 2010 platform regarding the user interface and utility of integration.

1. The technological impact of Knowledge Economy on higher education

The transition to knowledge-based economy requires the use and creation of knowledge in higher education as a decisive factor for social, economic, cultural and technological transformation. Achieving this goal necessarily involves the use of technology, particularly high technology, which would allow knowledge transmission and create new areas for education, research and development.

The impact of knowledge-based economy has attracted researchers and countries attention all over the world, especially due to technological implications of and open access to knowledge. Thereof, we would like to mention the Berlin Declaration (2003) with regard to open access for all to higher education and the European Commission directives that integrated the Bologna process with the European research policy in order to influence education development in EU countries. In order to effectively promote the development of knowledge-based economy, governments need to facilitate economic change and modernization processes, create new opportunities and generate income (Pacesila, 2006). Education should be recognized as the number one priority, and ICT as an important investment area.

The general infrastructure for providing conceptual and operational integration of ICT in all activity fields and daily life areas translates, in the case of higher education, into management, education and research (Figure no. 1). Thus, the conceptual framework of integrating ICT in higher education is reflected in aspects concerning: policy, objectives and incentives; resources and facilities; specialists with pedagogical skills; computer resources; teaching and learning activities; processes of performance monitoring and evaluation (Figure no. 2).

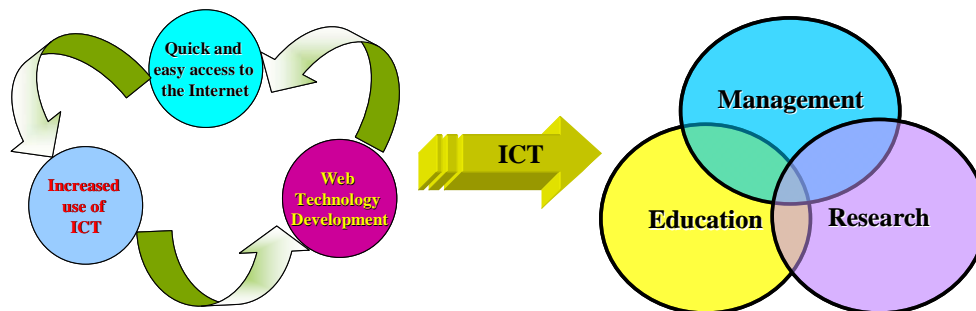


Figure no. 1: General infrastructure “knowledge society – higher education”

The rapid evolution of technology provides many opportunities but it also creates tensions that are difficult to manage as well as changes that are often difficult to implement.

Technological challenges are related to university management, learning spaces creation (e.g. fostering intuitive learning, flexible learning, combining physical/virtual environments, smart learning content) and learning no matter where, no matter when, no matter how, particularly within lifelong learning.

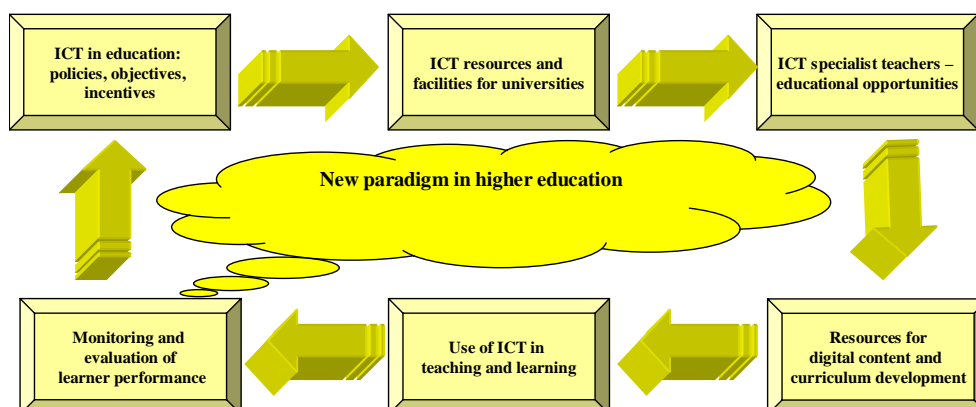


Figure no. 2: Conceptual and operational framework of ICT integration

1.1 Impact on university management

In order to respond to the pressures generated by knowledge economy requirements, higher education institutions must achieve cultural, strategic and operational changes, while dealing with internal barriers (e.g. traditions, limited resources). Without management changes, the European universities can not cope with demographic, economic and technological changes (see Brătianu and Nistoreanu, 2008). According to (Meek and Davies, 2009) the effectiveness of management models is to be evaluated based on universities' contribution to the knowledge society and the knowledge-based economy.

Currently there are several trends in defining higher education management models. Some European countries have abandoned the state control model. In Germany, 33 universities are free to decide on the teachers they hire and the courses they provide (Fielden, 2008). In the U.S. (Gumport, 2000) universities are seen as social institutions or as part of the national economy (at least 10% of the Senate members are representatives from industry, business or development partners). The second model provides actual changes in industry and business, sources of funding for education and research, but restricts the independence of universities. In Figure no. 3 are presented the main types of governance structures in European higher education.

According to Mthembu (2009) a good solution for governance is the university management carried out by *academic entrepreneurs* (academically oriented business people). Analyzing the advantages and disadvantages of different university management models, it was concluded that the optimal use of space and types of agents will transform the universities of the twenty-first century into an engine for social development and innovation. Thus, in 2005 the European Commission will support the modernization of European universities, creating a new type of arrangement (contract) with the society, where universities are responsible for educational programs, resources, personnel, while public authorities focus on the strategic direction of the overall system.

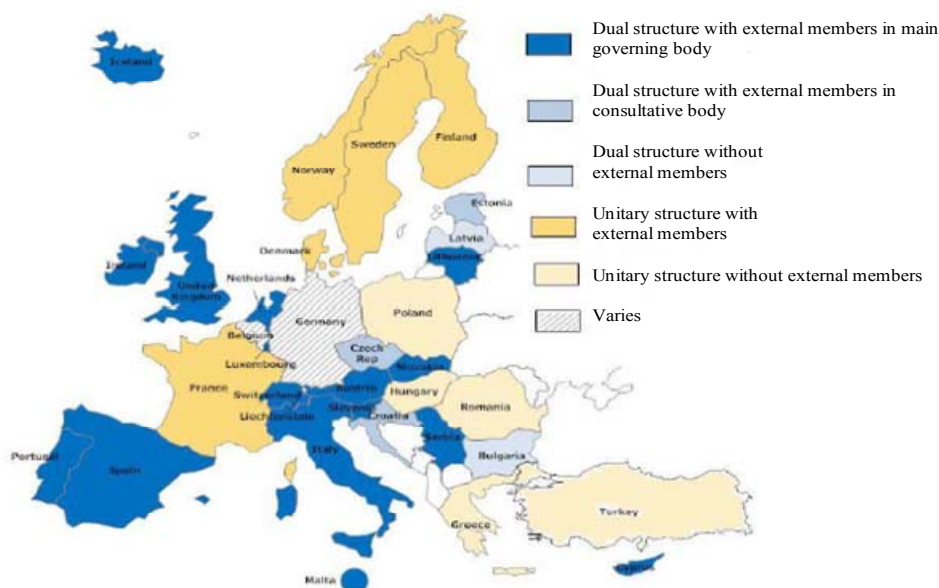
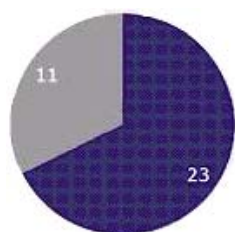


Figure no. 3: Governance structures

Source: Estermann, 2009, p.14

Universities (both within and outside EU) are characterized by heterogeneity in the organization, governance, operating conditions and “social contracts”, which define the political option. Given recent developments in the governance of universities in Belgium, Denmark, Germany, Estonia, France, Ireland, Latvia, Lithuania, Hungary, Netherlands, Austria, Portugal, Finland and the United Kingdom, the following trends have been observed (Hinfelaar and Polzin, 2006): reduced state involvement, while universities become more autonomous (Figure no. 4); increased power of university management, while the academic profession loses a degree of self-governance; state influence on academic development through performance-based contracts of funding; enhanced cooperation with industry and society.



- Universities are largely autonomous in the design of their administrative structures
- Restrictions affect more the design of the academic structures (name & number of faculties listed by law, guidelines)
- Universities may freely decide: AT, BE/F, BE/W, HR, CZ, DK, EE, FI, GR, HU, IS, IE, IT, LV, LT, MT, NO, PL, RS, SK, SI, SE, UK
- Universities may decide within certain limits: BG, CY, FR, DE, LU, NL, PT, RO, ES, C, TR

Figure no. 4: Academic structures

Source: Estermann, 2009, p.10

The analysis at management level must be carried out from different perspectives (Table no. 1).

Table no. 1: ICT prospects and implications on university management

Perspectives	Implications
<ul style="list-style-type: none"> - relationship between the national economy and teaching & research; - teaching and research internationalization; - management restructuring in all university sectors; - use of technology in management; - the power of the university in financing its own operations; - multiple instruments administration; - evaluation on specific knowledge-based economy indicators 	<ul style="list-style-type: none"> - a secure, reliable and manageable ICT environment; - computer presentation skills; - cooperation with private and regional organizations; - transparent information infrastructure and ICT governance; - free access to services; - SURF (Ubiquitous Robotic Service-oriented Framework) initiatives in areas where they are profitable.

Source: Boezeroy, Cordewener and Liebrand, 2007; Blackmore, Brennan and Zipin, 2010

1.2 The impact of adjusting the tuition, research and development process to EU requirements

Like other industries, education and research are affected by globalization trends (see Roşca, et al., 2008; Condrea and Stanciu, 2008). ICT access does not provide a response to all challenges of knowledge-based economy. In order to provide a solution to these challenges, the EU pursues a policy of aligning the education systems (educational content and methods) in Europe and of creating the European higher education area (under the Bologna reform), in accord with the principles of autonomy and diversity of national systems (Punie and Cabrera, 2006). This policy is intended to stimulate the development and dissemination of the *European elearning CMS* (Content Management Systems) as well as the access, based on ICT, to the European learning curricula.

The changes generated by ICT require changing university curricula and accreditation as well as the assessment mechanisms. Moreover, ICT can be considered a cross-curricular activity, as students should be encouraged to use technology in all possible ways. ICT supports the education system harmonization with EU requirements as perceived through its implications for all types of users (Table no. 2).

Table no. 2 Impact of ICT on education, research and innovation processes

Users	ICT Implications
Students	<ul style="list-style-type: none"> Open, computer-based educational offers Custom Digital Learning Environment Educational methods with personal portfolio Web-based self-service Experiential learning in immersive environments Experiential learning with "what if" analysis Intelligent objects in pedagogy and learning

Users	ICT Implications
	Cognitive repair and support (for people with special needs) Audio-visual content Web Blog sites for collaboration and knowledge building Intelligent environments of synchronous and social learning LCMS (Learning Content Management Systems)
Teachers	Computer-based, integrated and flexible teaching systems Training facilities for educational innovation Easy access to educational and research content Blog Web sites for collaboration and knowledge building Use of presentation software and of digital content LCMS
Researchers	Collaboration and transparent sharing of research infrastructures Quality review without copyright transfer Access to digital data and information Knowledge of the economic demands and carrying out research in accordance with these demands

Source: Punie and Cabrera, 2006; Boezerooy, Cordewener and Liebrand, 2007; UNESCO, 2008

ICT should be seen as a tool for changing traditional course content so that students become more innovative. Users must have basic knowledge of ICT and integration skills with other areas in order to make major changes and further economic innovation.

Achieving academic goals depends on important factors such as funding policies and different actions taken by the university. Regarding research, there should be a balance between privatization (restrictive intellectual property rights), mainly due to financial problems, and free access to knowledge, as a prerequisite for economic innovation. Therefore, public funding for research and development is essential to maintain/increase the level and quality of research results publicly available.

The involvement of students/graduates in the research activity will lead not only to knowledge creation, but also to the creation of routines in search, research, initiative, and entrepreneurship. The result consists in strengthening the link between academic research and teaching/industry, which is an important goal for universities in the knowledge-based society.

Regarding the adjustment of educational content and methods, a correlation has to be made between curriculum standards and available software packages/applications and the inclusion of appropriate ICT activities in teaching plans. They must allow knowledge creation and transmission as well as encourage end users to acquire specific ICT skills. It is also important to identify social arrangements that can be used with different technologies.

In conclusion, higher education institutions (especially those of Economics and Computer Technology) must become centers of knowledge, innovation and application of results to address society needs. A modern ICT infrastructure is a basic tool for the success of this initiative. Acquiring ICT knowledge is necessary in the knowledge-based economy, because a workforce that understands how to use technology is a tool for increasing productivity and innovation.

2. Solutions for improving agility and achieving innovation in higher education

The use of a *service-oriented approach* provides flexibility in the application of ICT facilities in higher education institutions. SURF identifies and disseminates best practices in education and a generic model of service-oriented architecture for universities. At the same time, an effective management of changes in universities is necessary, which involves the use of *business process management* (BPM), with implications on process automation and SOA (Service Oriented Architecture) governance.

Knowledge determines the market performance of each university and it is to be found in all university processes (education, research & development, and support). The existence of intensive knowledge-based processes entails that only a subset of activities within the processes can be automated. The existence of collaborative processes, involving complex interactions between participants and the need to use knowledge lead to a complexity that many BPM systems are unable to support. Thus, the present context requires a different approach, such as *Case Management* (Ghilic-Micu, Stoica, Mircea and Sinioros, 2010) which meets the needs of dynamic institutions.

The high costs of ICT in conjunction with the current financial crisis and universities limited resources require finding alternatives to the use of ICT, such as *Cloud Computing*. This is one of the most significant trends in ICT evolution, the second on Gartner's priority list from 2010. Cloud computing enables universities to focus more on teaching and research, rather than on complex IT systems and software configurations against payment. From a financial point of view, migrating to Cloud does not make sense for universities without SOA and BPM. Government involvement in organizing a centralized Cloud for higher education may stabilize the academic field and lead to fast results in research and innovation.

The potential and efficiency of SOA, BPM, Case Management and Cloud Computing use in higher education have been recognized by many universities and researchers in this field (see Mircea and Andreescu, 2010). In this paper we aim to expand the use of knowledge, process management, Business Intelligence, SOA architectures and Cloud solutions with the SharePoint 2010 platform in order to improve university management and to harmonize the teaching, research and development contents and methods with those of the European Union. This is done based on the authors' previous research on ICT with implications in higher education, detailed in the following four approaches and on issues still unsolved in the institution:

- an approach on how knowledge can be combined with business processes and intelligence so as to achieve agility in the collaborative environment with a case study on using agile BI solutions in AES.
- an approach on the use of Cloud Computing in higher education, highlighting its main benefits and limitations, with emphasis on data security. A strategy of adopting Cloud Computing in higher education is also proposed, which would promote its adoption, improved practices and innovation.
- the adjustment of BPM to SOA to achieve agility and a perspective on service-oriented BPM exemplified on the procurement department of AES.
- an integrated approach on the use of SOA, BPM and Cloud Computing mix in higher education, with emphasis on the need for implementation and its potential benefits. The

current state of universities in Romania has also been analyzed with respect to integrated solution implementation based on the latest technologies.

Universities that implement an integrated approach on the technological solutions mentioned above are in the best position to maximize agility. An integrated approach will also lead to innovation in research and educational areas and will reduce costs. In order to be successful, higher education institutions should always undergo market assessment and subsequent changes. Moreover, according to Stoica and Ghilic-Micu (2009) shifting from traditional to digital, from classical to virtual must be accompanied by proper quality support. To achieve quality management a balance is needed between quality standards and the costs for quality digital services.

AES, which is the coordinating university within an international consortium consisting of five universities (AES Bucharest, Babes Bolyai University of Cluj-Napoca, the Polytechnic University of Timisoara, Constanta Maritime University, George Baritiu University of Brasov) and of two software development companies (Kion Italy and Crystal System), began developing and implementing an Integrated Information System of University Management (SIIMU). The solution will ultimately provide operational efficiency and agility while improving services offered to key stakeholders (students, staff, the Ministry of Education, Youth and Sports).

The need to introduce SIIMU (detailed in Mircea, Ghilic-Micu and Stoica, 2010) has emerged as a result of the fact that AES, as well as other universities are facing a number of problems/difficulties in quickly adapting to market requirements and the current economic climate. However the solution is not unique and does not solve all the institution problems because knowledge economy opens opportunities for research, analysis and implementation of new solutions in response to market challenges and therefore involves permanent changes in organizations.

Currently, there are faculties/education areas which focus on traditional academic goals rather than on providing support to the economy. Within these institutions, connectivity with the industry/ development/ dynamics of the field is weak. In addition, the knowledge acquired by students is not entirely put into practice through the digital media specific to knowledge economy (Digital Management, BPM, BI systems, automated workflow, etc.). There are also gaps in assessing students' ICT skills, in monitoring the time spent in the digital space as well as problems of reluctance/rejecting the use of new technologies by a part of university stakeholders.

According to a study by Nistoreanu, Hornoiu and Nistoreanu (2010) on a 525 students sample in AES on "aspects of the higher education teaching system", results of the teaching methods in the educational process are not encouraging. The survey also shows the students' low interest for research during college years.

The results from the survey conducted with first year students in the Master's Degree Computer Economics Course, from the Faculty of Cybernetics, Statistics and Computer Economics (CSIE), also prove low student involvement in research (Table no. 3). However, good results have been obtained regarding ICT use, but they can not be extrapolated to the institution level as a whole, due to the small sample and to the faculty's IT profile.

Table no. 3: Results of ICT implication in AES, CSIE Faculty

Question	Result
Percentage of students involved in research activities	42.86%
The use of ICT education activity: teaching, learning, evaluation (rank quality/grade)	8.43/70.71% 8.93/69.22% 8.50/82.50%
Use of ICT in support activities (rank quality /grade)	8.57/78.21%
Technology used	New
Percentage of computer content	67.51%

One of the AES objectives is to play a key role in the economic and technological development through the faculties specialized in Economics, Business and Computers. Creating specialists with specific up-to-date knowledge and the appropriate ICT leads to the creation of knowledge within economy and to economic innovation. In order to achieve this goal, greater efforts are needed to integrate ICT as a pedagogical tool and part of the educational content. This can be achieved through managerial support and the professors' initiative in AES managerial team.

3. Case Study. SharePoint 2010 integration with the existing IT solutions

The integration of SharePoint 2010 with the existing IT solutions aims at solving current problems facing the Academy of Economic Studies related to university management and adaptation of the teaching content and methods to EU requirements. SharePoint is not the only solution on the market designed to solve some of the current problems. Here are some of the selection grounds for SharePoint 2010:

- *low cost of acquisition.* Low annual licensing cost (excluding VAT 1483.82 lei in 2010) due to large discounts offered by Microsoft for licenses purchased by AES (4123 various Microsoft licenses in 2010);
- *market leader in providing solutions ECM* (Enterprise Content Management). With SharePoint 2010, Microsoft is considered by Gartner (Bell, Shegda, Gilbert and Chin, 2010) the market leader (Figure no. 5). The evaluation was conducted from the perspective of six key components: document management, Web content management, records management, image processing applications, social content, workflow/BPM, extended components. The evaluation criteria were grouped according to execution ability and vision completeness.
- *widespread use.* According to Gartner, SharePoint 2010 has a high market penetration. The interdependence of SharePoint, Office, Windows, Exchange and Microsoft SQL Server helps to strengthen the leadership of Microsoft in providing applications platforms centered on collaboration and documents.
- *ECM strategy.* SharePoint 2010 has determined many organizations to focus on ECM strategy (Bell, Shegda, Gilbert and Chin, 2010). It also influences other providers on the ECM market in positioning the products as logical additions within a hybrid content architecture based on SharePoint.

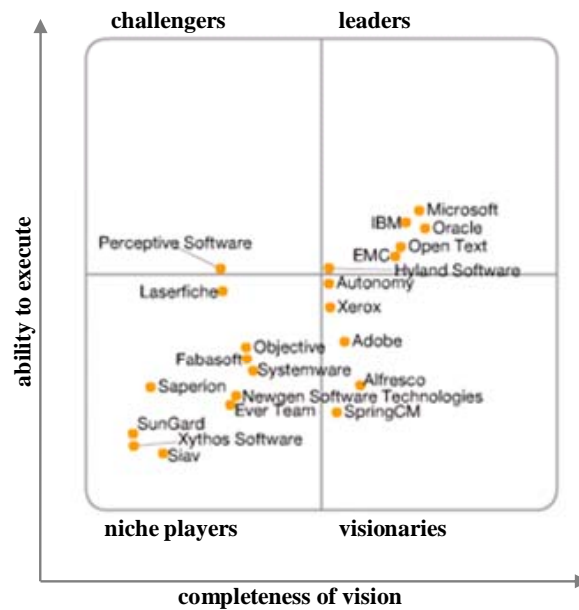


Figure no. 5: Magic Quadrant for Enterprise Content Management in 2010

Source: Bell, Shegda, Gilbert and Chin, 2010

- *facilities offered.* SharePoint 2010 goes beyond content management by technologies of collaboration, search and portal, attracting applications upgrade to this solution. Because of Microsoft's market position, SharePoint has attracted several major ecosystems. Many software vendors build extensions, while system integrators create big businesses around its implementation and customization.

- *integration with existing IT solutions.* SharePoint 2010 integrates with the existing solutions of AES, such as IDM (Identity Management), SIIMU, stock management (currently in testing phase), etc. Based on username (email address provided by the institution) and password (email password), the user can connect to the SharePoint platform. Access to data, applications, possibility to create/modify content and management of users are carried out according to the roles administered in the IDM solution in conjunction with those administered in SharePoint 2010.

In terms of university management, the solution can be used both to improve management and to reduce administrative costs. SharePoint 2010 is a collaboration platform for the institution and the Internet. SharePoint 2010 provides many benefits to management through the following products/ technologies:

- *SharePoint Foundation* is the technology used for all SharePoint sites. This allows the rapid creation of various types of sites where collaboration is possible within web pages, documents, lists, calendars and data.

- *SharePoint Server* provides a unitary and familiar framework for lists and libraries, site administration and customization as well as additional features and capabilities such as

content management at the level of the institution, Business Intelligence, search at the level of the institution and personal profiles within sites.

- *SharePoint Designer* is a program to design, build and customize websites running SharePoint Foundation and SharePoint Server. With SharePoint Designer 2010, web pages with rich data can be created, powerful solutions for workflow can be built and the websites' layout and style can be designed. Web sites that can be created may range from small team sites for the management of projects/departments to dashboard-based portal solutions.

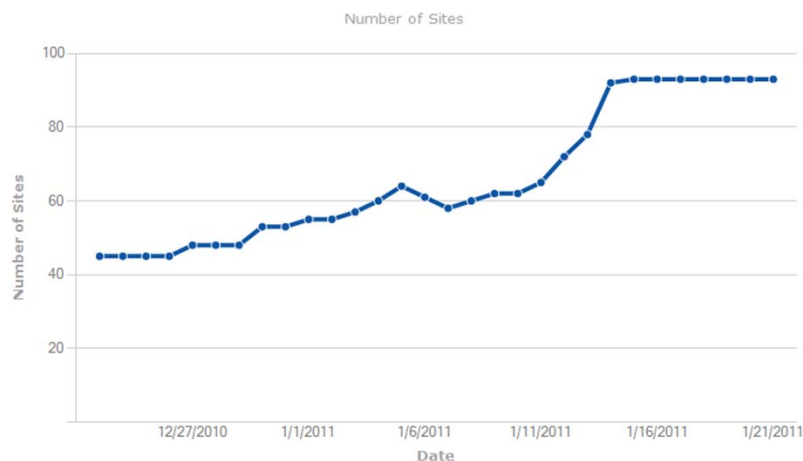
- *SharePoint Workspace* is a desktop program that can be used to move the SharePoint site content offline and to collaborate on the content with other persons during the absence of network connection. Subsequently, the content will be synchronized with the SharePoint site.

At the same time, SharePoint 2010 will lead to lower costs related to paper documents management, to cooperation between employees/ departments (transmission/ search of information), and shorter time to achieve tasks. This solution is currently used in the networking department and developed/tested for use in procurement, both to improve activity in the department and relationship with the products/services beneficiaries. With respect to the education and research process, SharePoint 2010 provides benefits to all participants (Table no. 4).

Table no. 4: Facilities provided by SharePoint 2010 to the education and research process

Users	Facilities
Students	<ul style="list-style-type: none"> - skills/knowledge in the use/integration of ECM platforms in organizations to support development of business/economy; - putting into practice the theory learned (elements of organization management, project management, Business Intelligence etc.); - collaboration (e.g. blogs) and advanced search; - stimulating of creativity and creation of knowledge; - secure access to digital content based on rights/roles.
Teachers	<ul style="list-style-type: none"> - digital content management (e.g. teaching materials, students' results); - use of the platform for teaching and assessment; - monitoring students' online activity: statistics, work reports grouped by various criteria (Figure no. 6) - collaboration and advanced search; - secure access to digital content based on rights/roles.
Researchers	<ul style="list-style-type: none"> - collaboration between researchers and advanced search; - reports on research results grouped by different criteria; - Business Intelligence facilities; - secure access to digital content based on rights/roles; - project management.

6.a



6.b

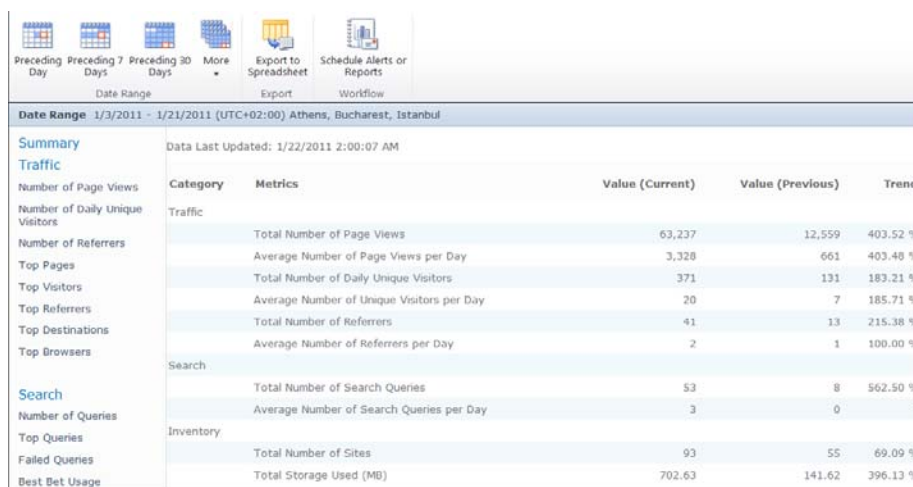


Figure no. 6: Examples of online activity statistics within the platform

In order to provide superior student training in using the latest technology and to create ICT skills, SharePoint 2010 was chosen as the solution to use in the “Virtual organization of activities” subject tutorial for first year Master Degree Computer Economics Course. After two weeks of testing the platform at the seminar, the results related to SharePoint 2010 platform were: a) user-friendly interface of SharePoint 2010 - mark 8, b) Attractiveness of SharePoint 2010 use as a collaboration tool - mark 7.71, c) usefulness of SharePoint 2010 in educational activity – mark 8.43, d) Utility of SharePoint 2010 to support activities within AES – mark 8.14.

The results encourage SharePoint 2010 integration in AES, although they were obtained only after the first two weeks of seminar use. At the end of the semester there was an improvement in results due to accumulation of knowledge and familiarity with the SharePoint interface. The use of SharePoint 2010 in acquisitions will also solve some

problems related to beneficiaries' relationship management such as: report management, beneficiary briefing, and use of work flows.

Conclusions

The paper emphasizes the link between higher education, knowledge and innovation as development bases for the knowledge-based society. Universities are encouraged to use ICT to align with EU requirements and with the new economy. Thereof, the paper presents ICT implications on higher education, as applied in AES. Reference is made to modern IT solutions which, through integrated use, improve agility and innovation in higher education. The integration of SharePoint 2010 (considered the market leader according to the Gartner report) with existing IT solutions is proposed as a way to improve university management and ensure alignment of the education process to EU requirements.

The following lines of research are worth mentioning: analysis, design and implementation of e-learning platforms that are specific to the knowledge-based information society; computer auditing and ensuring e-learning quality solutions according to the SCORM standard; development of integrating solutions like Cloud; analysis of the economic, social and environmental impact of ICT adoption in education and business activities through SOA, BPM, and Case Management paradigms; ICT implications in education and business within the new Romanian legislation.

Acknowledgements

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References

1. Bell, T., Shegda, K., Gilbert, M. and Chin, K., 2010. *Magic Quadrant for Enterprise Content Management*. [online] Gartner. Available at: <<https://www1.vtrentz.net/imarkownerfiles/ownerassets/2177/Hyland-Magic-2010.pdf>> [Accessed 10 January 2011].
2. Blackmore, J., Brennan, M. and Zipin, L., 2010. Repositioning University Governance and Academic Work: An Overview. In: J. Blackmore, M. Brennan and L. Zipin, eds. 2010. *Re-Positioning University Governance and Academic Work*. The Netherlands: Sense Publishers, pp.1–16.
3. Boezerooy, P., Cordewener, B. and Liebrand, W., 2007. Collaboration on ICT in Dutch Higher Education: The SURF Approach, *EDUCAUSE Review*, [online]. Available at <<http://www.educause.edu/EDUCAUSE+Review/EDUCAUSEReviewMagazineVolume42/CollaborationonICTinDutchHighe/158134>> [Accessed 5 October 2010].
4. Brătianu, C. and Nistoreanu, B.G., 2008. Change and Ethics in the Higher Education. *Amfiteatru Economic*, X (23), pp.235-239.

5. Condrea, E. and Stanciu, A., 2008. Considerations Concerning the Educational Quality Management. *Amfiteatru Economic*, X(Sp. Iss. 2), pp.120-125.
6. Estermann, T., 2009. *What is university governance? University governance & autonomy in Europe*. [online] Available at: <http://www.charta-universities.eu/fileadmin/downloads/TE_University_governance_Luxembourg_05.06.2009final_1_-1.pdf> [Accessed 7 January 2011].
7. Fielden, J., 2008. *Global trends in university governance*. [online] Washington: The World Bank. Available at < http://siteresources.worldbank.org/EDUCATION/Resources/278200-1099079877269/547664-1099079956815/Global_Trends_University_Governance_webversion.pdf> [Accessed 10 January 2011].
8. Ghilic-Micu, B., Stoica, M., Mircea, M. and Sinioros, P., 2010. Cost - Performance Evaluation Environment for the Adoption of A Case Management Solution. *Journal of Economic Computation and Economic Cybernetics Studies*, 44/(1), pp. 63-80.
9. Gumpert, P., 2000. Academic restructuring: organisational change and institutional imperatives. *Higher Education*, Issue 39, pp.67-91.
10. Hinfelaar, M. and Polzin, M., 2006. *Report on "University Governance"*. [online] Copenhagen: Work Programme: Education and Training 2010. Available at: <http://www.kslll.net/Documents/PLA_University%20Governance_final%20report_May%202006.pdf> [Accessed 10 January 2011].
11. Lazowska, E., Lee, P., Elliott, C. and Smarr, L., 2008. *Infrastructure for eScience and eLearning in Higher Education*. [online] Washington: Computing Community Consortium. Available at <<http://www.cra.org/ccc/docs/init/Infrastructure.pdf>> [Accessed 10 January 2011].
12. Meek, L. and Davies, D., 2009. Policy Dynamics in Higher Education and Research: Concepts and Observations. In: V.L. Meek and M.L. Kearney, eds. 2009. *Higher Education, Research and Innovation: Changing Dynamics. Report on the UNESCO Forum on Higher Education, Research and Knowledge 2001-2009*. Kassel: INCHER-Kassel. Ch. 3.
13. Mircea, M., (in press) Adapt Business Processes to Service Oriented Environment to Achieve Business Agility. *Journal of Applied Quantitative Methods*. (Accepted for publication December 2010).
14. Mircea, M., 2010. SOA, BPM and Cloud Computing: Connected for Innovation in Higher Education. In: IACSIT (International Association of Computer Science and Information Technology), *2010 The International Conference on Education and Management Technology (ICEMT 2010)*. Cairo, Egypt, 2-4 November 2010. Chengdu: Institute of Electronics and Electronics Engineers.
15. Mircea, M. and Andreescu, A.I., 2010. Extending SOA to Cloud Computing in Higher Education. In: K. Soliman, *The 15th IBIMA conference on Knowledge Management and Innovation: A Business Competitive Edge Perspective*. Cairo, Egypt, 6-7 November 2010. Norristown: International Business Information Management Association.
16. Mircea, M., Ghilic-Micu, B. and Stoica, M., 2010. Combining Knowledge, Process and Business Intelligence to Delivering Agility in Collaborative Environment. In: L. Fischer, ed. 2010. *2010 BPM and Workflow Handbook, Spotlight on Business*

- Intelligence*. Florida: Future Strategies Inc. & Workflow Management Coalition, pp.99-114.
17. Mthembu, T., 2009. *University governance and the knowledge economy: Reconditioning the engine of development*. [online] South Africa: Development Bank of Southern Africa. Available at: <<http://www.dbsa.org/Research/DPD%20Working%20papers%20documents/DPD%20No%203.pdf>> [Accessed 10 January 2011].
 18. Nistoreanu, B.G., Hornoiu, R.I. and Nistoreanu, P., 2010. The Adjustment of Perspective Among Students Regarding Protection of Educational Services' Consumer. *Amfiteatru Economic*, XII (28), pp.348-359.
 19. Niță, V. and Agheorghiesei, D.T., 2010. The perception of the students specializing trade, tourism and services on the importance of the concept of sustainable development in commercial activities. *Amfiteatru Economic*, XI (27), pp.66-82.
 20. Pacesila, M., 2006. The Impact of Moving to Knowledge Based Economy in the Public Sector. *Management and Marketing Journal*, 4(1), pp.113-118.
 21. Plumb, I. and Zamfir, A., 2009. Managing Service Quality within the Knowledge-Based Economy: Opportunities and Challenges. *Amfiteatru Economic*, XI (26), pp.373-382.
 22. Punie, Y. and Cabrera, M., 2006. *The Future of ICT and Learning in the Knowledge Society Report on a Joint DG JRC-DG EAC Workshop*, Seville 20-21 October 2005. Spain: European Communities.
 23. Roșca, I.G. et al., 2008. Quality Assurance Systems in Higher Education. *Amfiteatru Economic*, X(Sp. Iss. 2), pp.6-12.
 24. Stoica, M. and Ghilic-Micu, B., 2009. Standards and Costs for Quality Management of E-Learning Services. *Amfiteatru Economic*, XI(26), pp.355-363.
 25. UNESCO, 2008. *ICT Competency Standards For Teachers, Implementation Guidelines Version 1.0*. [online] United Kingdom: United Nations Educational, Scientific and Cultural Organization. Available at: <<http://cst.unesco-ci.org/sites/projects/cst/The%20Standards/ICT-CST-Implementation%20Guidelines.pdf>> [Accessed 10 January 2011]
 26. Zaman, G., Sandu, S. and Anghel, I., 2009. Intergenerational partnership in research and development activity. *Amfiteatru Economic*, XI (26), pp.606-615.